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DIFFERENTIAL APPROACHES TO THE REDUCTION OF PHOBIC ANXIETY RESPONSES

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by

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A thesis submitted in partial fulfillment of
the requirements for the degree of Master of Arts in psychology
in the Graduate School of the
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PREFACE

The author takes pleasure in acknowledging the advice and supervision given to him by Dr. Edward H. Tiller throughout this research. Appreciation for their assistance is also extended to Dr. Fred J. Kozub, Mrs. Jean N. Dickinson, Mrs. Jane M. Meeks, and Mr. Wallace Scherer of Psychological Instruments, Inc.

ABSTRACT

This experiment was designed to answer two questions: (1) Is relaxation training a necessary element in the reduction of phobic anxiety responses? and (2) Does reciprocal inhibition by relaxation constitute the most viable conceptual basis for the successful operation of desensitization therapy, as compared to alternative interpretations investigated? An equal number of freshman and sophomore college students were assigned to one of three experimental groups and a control group (Reciprocal Inhibition, Habituation, Facilitation, and Control). Treatment effects were evaluated with regard to reduction of snake-phobic anxiety by way of two physiological measures (skin conductance and respiration) and a behavioral measure (approach test). Significant F ratios were obtained for skin conductance scores ($p < .05$) under the Habituation condition and for approach test scores ($p < .01$) under the Facilitation condition. It was concluded that relaxation training, although possibly functioning as a facilitation agent, is not a necessary element in the desensitization of anxiety responses, since Ss not undergoing training were seen to manifest significant fear reduction. Further, it must be concluded that the comparative effectiveness of the treatments employed is a function of the measure being taken, be it physiological or behavioral. With reference to future research, depending upon what aspect of fear is to be measured, i.e., skin conductance recordings or the approach to a feared object, investigators should select that method which has been shown to be maximally effective in modifying that aspect of fear.

INTRODUCTION

While it is assumed that multiple factors are involved in the application of systematic densensitization therapy (Paul, 1966; van Egeren, 1971) in the reduction of phobic anxiety, the most popular, albeit controversial, mechanism of explanation has been Wolpe's (1958) "principle of reciprocal inhibition." Accordingly, the ability of given stimuli to elicit anxiety will be permanently weakened "If a response antagonistic to anxiety can be made to occur in the presence of anxiety-evoking stimuli so that it is accompanied by a complete or partial suppression of the anxiety responses...(Wolpe, 1958, p. 71)." Wolpe's theoretical explanation of the desensitization process is based on Sherrington's (1906) concept of reciprocal inhibition, whereby the evocation of one reflex suppresses the evocation of other reflexes, and appears basically indistinguishable from Guthrie's (1932) view of counter-conditioning, entailing the notion that the elimination of a response can be achieved by eliciting a strong incompatible response in the presence of cues which ordinarily elicit the undesirable behavior. Although Wolpe has used and recommended several anxiety-antagonistic responses, among them eating, sexual responses, and assertive responses, muscular relaxation has come to enjoy the greatest popularity among practitioners.

In an effort to avoid terminological problems seemingly inherent in the area of desensitization, it should be pointed out that although Wolpe

(1958) oftentimes used the terms "reciprocal inhibition" and "counter-conditioning" interchangeably, the former concept is to be preferred in the present paper, reciprocal inhibition being considered but one of many counter-conditioning techniques available.. Further, it is with muscular relaxation, and not anxiety-antagonistic responses in general, that the present study will concern itself.

The actual technique for inducing relaxation is an abbreviated form of the procedure described by Jacobson (1936), whose peripheralist position led him to conclude that emotional states, such as anxiety, fail to exist in the presence of complete bodily relaxation. Essentially a patient is taught to tense and then release gross muscle groups until, ideally, total bodily relaxation results. Whereas Jacobson employed relaxation as a sole means of treating neurotic fears, and thus expended 90 to 100 hours in relaxation training per client, Wolpe recommends six or fewer training sessions per subject and expands his treatment package through the further application of his reciprocal inhibition principle.

If the construct of anxiety is defined as Wolpe (1966) defines it, as sympathetic-dominated autonomic nervous system activity, and the relaxed patient is presented with progressively more aversive stimuli in an incremental fashion, then the anxiety responses should be suppressed by the primarily parasympathetic, and consequently antagonistic, muscular relaxation responses. This appears to be the case since, although there are occasions when the sympathetic and parasympathetic branches might work in coordination, it is generally held that the two divisions act in opposition. While one system excites an organ to increased activity, for example, the other inhibits or decreases its activity. Within the actual therapeutic process, the anxiety-arousing stimuli may take the form of

either imaginal or in vivo visualizations, the relaxed patient being presented with the fear-eliciting stimulus events one at a time. Theoretically, the anxiety responses conditioned to these aversive stimuli will be suppressed by the stronger, antagonistic relaxation responses.

Several converging lines of research (Lang and Lazowik, 1963; Lomont and Edwards, 1966; Lazarus, 1961) appear to support Wolpe's basic principle which predicts that relaxation training produces effects which operate antagonistically to inhibit anxiety responses. Paul (1969) evaluated the comparative effects of hypnotic suggestion and relaxation training with regard to reduction of subjection tension and physiological arousal, the latter by way of heart rate, respiratory rate, tonic muscle tension, and skin conductance measures. It was found that brief relaxation training, given by the experimenter according to Paul's (1966) manual, was significantly more effective in producing desired physiological changes, i.e., changes in a direction opposite to that of "anxiety", then was hypnotic suggestion.

Davidson (1968) in working with four groups of snake-phobic Ss implemented a design in which two groups received systematic desensitization with relaxation training via cassett-recorded instructions. While one of these groups was presented with a hierarchy containing stimuli relevant to a fear of snakes, the other was presented with snake-irrelevant stimuli. A third group was given systematic desensitization without relaxation, and a non-treatment control constituted the fourth. Significantly greater improvements in fear reduction, on the basis of avoidance test measures, were found for Ss treated with systematic desensitization encompassing relaxation and relevant hierarchy presentation, than for the alternative

conditions. Although it is not possible to attribute the successful results of the study to relaxation training alone, it none the less appears to be an essential factor, since the groups not receiving relaxation training did not exhibit significantly greater fear reduction as compared to controls.

In spite of the number of studies which lend support to the idea that relaxation is a necessary part of desensitization, there still remains the possibility that some alternative process might account for the apparent efficacy of the therapeutic technique. The argument has been presented (Lomont and Edwards, 1965) that classical extinction is the effective mechanism underlying desensitization therapy. Lomont (1967) in reviewing research relevant to reciprocal inhibition therapy found the results of all studies reviewed, with the exception of one, to be explainable on the basis of classical extinction alone. Lomont, without actually demonstrating it, claims a classical extinction procedure common to all of Wolpe's techniques, his rationale being that the patient experiences conditioned stimuli for anxiety without any reinforcement by subsequent punishment. Although Wolpe (1958) holds that conditioned avoidance responses are often persistent under an ordinary classical extinction procedure in which Ss are free to make the avoidance response to the conditioned stimulus (CS), there may be some basis for Lomont's inferential argument, in that the extinction procedure a la Wolpe does not call for free avoidance responses on the part of the patient. On the contrary, the therapist determines the duration of aversive CS imagination, and consequently the patient is prevented from avoidance conditioning, i.e., prevented from making a response which would serve to postpone aversive stimulation.

Wolpe explicitly rejects classical extinction, the process of presenting the conditioned stimulus unaccompanied by reinforcement such that a decrement in the conditioned response follows, as a viable explanation of systematic desensitization. He argues (Wolpe, 1958, p. 71) that repeated exposure to a fear-eliciting stimulus alone is ineffective in reducing or eliminating anxiety responses, due to the fact that autonomic responses generate only a minimal amount of reactive inhibition. This argument is based entirely upon the Hullian fatigue theory of extinction, a conceptualization which has not gone unchallenged (Jenson, 1961; Adams, 1963).

While reference is being made to the concept of extinction, it should be pointed out that although classical experimental extinction and the process of habituation are procedurally identical, the former entails assumptions concerning the original learning (the conditioning of a UCS to a neutral stimulus) whereas the latter does not. Frequently, throughout the desensitization literature reference is made to an ongoing process erroneously identified as classical extinction, when, in fact, a demonstration of this original learning is lacking. It is for this reason that within the present study the term and process of habituation rather than extinction will be utilized, since no assumptions are made concerning the original acquisition of anxiety responses.

A basic theoretical dispute, then, which has arisen in relation to desensitization, as originally conceived, involves the question of whether reciprocal inhibition encompassing relaxation training is a necessary condition

for therapeutic success, where the objective is the most effective reduction of maladaptive anxiety responses. Stated differently, does desensitization entail only a reduction in the intensity or habit strength of the anxiety responses; does it involve the acquisition of an alternative response,in this case relaxation, to the anxiety-arousing stimuli; or does it involve both processes? Wolpe's view, of course, dictates that not only is the bond between the anxiety response and the evoking stimulus weakened during desensitization, but that an alternative response, the reciprocal of the maladaptive response, be strengthened such that presentation of the stimulus is more likely to evoke the new response.

A conceptualization of desensitization in terms of the habituation rather than counterconditioning paradigm is not necessarily inconsistent with the necessity for relaxation. For it may be that rather than providing for "reciprocal inhibition," since anxiety "generates too little reactive inhibition to form the basis of conditioned inhibition," relaxation functions as a facilitating agent. In order to encourage phobics to expose themselves to what is feared it may be necessary not only to create a situation that is graduated in terms of anxiety eliciting potential, beginning with relatively non-anxiety provoking degrees of the fear stimulus, but also to provide the person with a comforting, more adaptive response, one example of which is relaxation.

Vodde and Gilner (1971) investigated three hypotheses in an attempt to clarify the underlying mechanisms in systematic desensitization. Five groups of Ss were exposed to slides of a laboratory rat, one group of

which received a reciprocal inhibition treatment, each S having been given an hour session in relaxation training via a tape recording of standard clinical procedure according to Wolpe. Another group received treatment consisting of exposure to the scenes alone, without any attempt at relaxation. These latter Ss were merely instructed to watch the scenes. Yet another group received a "facilitation" condition which consisted of reinforcing each S for maintaining exposure to the threatening stimuli. The Ss in this treatment group were informed that they could earn points (later redeemable for money) for remaining in the presence of the phobic object for some pre-determined amount of time. The performance of Ss on a posttreatment avoidance measure indicated that relaxation was not a necessary condition for anxiety reduction, the group receiving money having manifested fear change comparable to the reciprocal inhibition group. The conclusion drawn by the authors was, ..."that any contingency which provides an incentive for the S to remain in the presence of a fear arousing stimulus, and to attend to it, will facilitate extinction of the avoidance response to that stimulus, in the absence of real aversive consequences (P. 173)."

It would seem that those who would not support a desensitization approach, as based on Wolpe's principle of reciprocal inhibition by relaxation, are protesting on one or both of two interrelated issues. First, it is felt by some (Davidson, 1966; Rachman, 1968) that although muscular relaxation may facilitate the desensitization of neurotic fears, it is not a necessary element. If this is, in fact, the case, then relaxation training might better be dispensed with. Although it is known that extensive relaxation

training may well be followed by a lowered level of arousal (Mathews and Gelder, 1969), as Mathews (1971) has stated, no direct evidence has been uncovered for one of the central postulates of reciprocal inhibition theory, that relaxation eliminates or prevents the autonomic anxiety responses associated with phobic stimuli. Secondly, there exist those experimenters (Lomont, 1965; Vodde and Gilner, 1971) who attribute the apparent efficacy of reciprocal inhibition to some alternative underlying process, e.g., habituation, facilitation hypotheses.

The present study was designed to evaluate two critical questions: (1) Is relaxation training a necessary element in the reduction of phobic anxiety responses? and (2) Does reciprocal inhibition by relaxation constitute the most viable conceptual basis for the successful operation of desensitization therapy, the two immediate alternative interpretations being habituation and the facilitation hypothesis (Vodde and Gilner, 1971) ? It was hypothesized that the Ss undergoing the reciprocal inhibition procedure within the present study, would manifest significantly greater reductions in anxiety than Ss undergoing alternative conditions, with respect to all dependent variable measures.

METHOD

Subject Selection

Forty-nine students from Richmond and Westhampton Colleges were given a brief explanation concerning the present study and requested by the E to rate themselves for snake fear. The rating was done on a five-point scale comprised of the following items: (1) no fear, (2) mild fear, (3) normal fear, (4) much fear, (5) terror. Thirty students, rating themselves with a four or a five, were asked to volunteer for the experiment and scheduled to undergo the pre-treatment approach test. All participants were either freshmen or sophomores with ages ranging from 18-20.

Design

The design consists of a single factor experiment with an unequal number of Ss assigned to one of three experimental groups and a control group (Reciprocal Inhibition, Habituation, Facilitation, and Control). Each of the Ss was matched according to a pre-treatment assessment of snake fear on the basis of approach test performances and then randomly assigned to a group.

Comparative treatment effects were evaluated with regard to reduction of snake-phobic anxiety by way of two classes of dependent variable measures: (1) physiological assessment (skin conductance and respiration), and (2) gross behavioral assessment (approach test).

Dependent Variable Measures

The two physiological measures were included in an effort to provide reliable evidence as to whether an actual change in autonomic activity was found. Lang (1969), in reviewing laboratory studies of human fear, places special emphasis on the need to focus on the development of adequate assessment techniques, i.e., psychophysiological recording, in future research within desensitization and related areas.

Although useful results have been found using respiration and EMG measures, the most consistently significant effects have been observed using skin conductance or cardiovascular responses, particularly heart rate (Mathews, 1971). However, a more extensive perusal of controlled studies in desensitization using physiological measures indicates heart rate to be a better gauge of response change to phobic imagery than to externally presented stimulation (Grossberg and Wilson, 1968; Paul, 1966). Since the present study concerns itself with an in vivo presentation of the phobic object, respiration and skin conductance indices were selected. The responses were simultaneously recorded on standard polygraph recording paper for both 30 second and two minute intervals. All physiological recording, at the rate of six inches per minute, was done on a modified Keeler model 302. The recordings were converted to raw scores by way of a scale devised by the author. The scale consisted of a three-point identification system which provided a numerical average with regard to an increase or decrease in both physiological measures per one minute of recording.

Fear is generally acknowledged to be a complex behavioral phenomena, which includes physiological, verbal, and gross motor responses.

A gross motor response was chosen, it having been previously found to be a successful indicator of fear change in studies involving desensitization (Davidson, 1968; Rachman, 1965). The actual recording of this response system involved a simple count made by the experimenter of successfully completed approach responses toward the phobic object.

Procedure

All Ss individually underwent a pre-treatment approach test, a seven-point behavioral measure of snake fear which was a modified version of the test employed by Davidson (1968). The test which was carried out in a room other than the experimental room to be used during the treatment, involved the following steps: (1) Moving to within five feet of the caged snake, (2) moving to within three feet of the caged snake, (3) touching the cage with a bare-hand, (4) reaching in the cage and touching the snake with a gloved-hand, (5) reaching in the cage and touching the snake with a bare-hand, (6) picking-up and holding the snake with a gloved-hand for ten seconds, and (7) picking-up and holding the snake with a bare-hand for ten seconds. The phobic object which lay caged on a table in the center of the room, was a Boa Constrictor of approximately one and one-half feet in length. Any S found capable of touching the phobic object (step number four) during this pre-treatment assessment phase was eliminated from the experiment. Although frightened, six potential Ss were able to establish contact with the reptile, and consequently, had to be eliminated. The eligible Ss (23 females and one male) were matched, i.e., grouped according to the number of successfully completed steps. From these matched groups, Ss were randomly assigned to the different treatment conditions so as to constitute clusters of equally avoidant Ss across conditions.

Following the behavioral assessment of snake fear, all Ss , over a

period of three weeks, underwent two sessions conducted by the E.

Session I for all Ss consisted of each individual group, as a group, listening to a 25 minute cassette tape recording narrated by Arnold Lazarus from a tape series entitled "Tensions Inherent in Daily Living" (1971). The Habituation group, as well as the Facilitation and Control groups, listened to a tape which dealt with a modern sexual outlook, (Lazarus, 1971). The Reciprocal Inhibition group, on the other hand, listened to and followed the instructions given on a tape which consisted of training in muscular relaxation, (Lazarus, 1971), and, as such, received the only treatment-relevant recording. An over-all administration of the above-described treatment afforded equal contact with the E across groups.

Essentially the instructions involved in the relaxation training entailed a dequential focus of attention on specific gross muscle groups throughout the body with induced tension followed by release upon the instructor's command. The particular relaxation training administered necessitated 5-7 second tension periods with 20-30 second periods of release. During the release phase for each muscle group, instructions to focus attention accompanied by suggestions of heaviness, warmth, and relaxation are repeated before moving to the next muscle group.

Upon entering the experimental room for Session II at their individually assigned times, each S was seated in a recliner chair and informed as to the purpose of the experiment and what would be expected of them. A brief amount of time was allotted to answering any questions the S might have. Immediately thereafter the experimenter attached the physiological recording apparatus which consisted of a pneumograph chest assembly and two finger receptacles, each with an electrode plate. Some explanation as to the

purpose of the apparatus was given while the attachments were being made. Once made ready, the S was instructed to sit quietly with eyes open while instrument calibration was completed. This began a five minute silent adaptation period, after which the treatment or control procedures were undertaken, averaging 37 minutes across groups.

Reciprocal Inhibition (RI)

This treatment has been described above as being basic to Wolpe's (1958) theoretical explanation of the systematic desensitization process. It should be understood that the typical reciprocal inhibition procedure, as used, for example, in previously mentioned studies encompasses a hierarchy of fear items, training in muscular relaxation and desensitization proper. While it is granted that the reciprocal inhibition treatment set forth in the present study falls short of the complete package, lacking both the construction of a hierarchy and an item by item desensitization process, it is felt that the basic mechanism responsible for fear change remains operational, i.e., anxiety-antagonistic responses are to be conditioned to previously fear-provoking stimuli.

Treatment commenced with the S being confronted with a live snake caged in a glass aquarium which lay to the Ss immediate right. For a period of two minutes the S was instructed to reach into the cage and maintain contact with the reptile. During this period a mark was made on the polygraph paper at 30 second intervals to serve as a pre-treatment physiological baseline measure of snake phobic anxiety.

Following the initial two minutes, after which the snake was removed from his view, the S underwent another 25 minute session in relaxation training again by way of the Arnold Lazarus tape (Exercise I, 1971) previously administered. Once the tape had played through, another mark was made on the recording paper and the snake again exposed.

At this point the S was again instructed to touch the phobic object for two minutes while further physiological recordings were taken. This two minutes was terminated by again removing the snake from the S's vision, after which time he was given additional instructions in relaxation from Exercises II by Lazarus (1971). These latter exercises were continued for five minutes, before another mark was made on the recording paper and the snake re-exposed for a final two minutes, to be considered post-treatment assessment of snake fear. The S was then disengaged from the apparatus, asked to move his head, arms, and legs, and permitted to leave the room.

Habituation (H)

Habituation was defined, in the present experiment, as response reduction resulting from repetition of constant stimulating conditions. As such, the Ss undergoing this treatment condition were instructed to attend to and touch the snake at two minute intervals for a period of ten seconds. The S was not required to maintain constant contact with the phobic object due to the extended duration of snake exposure (25 minutes) under this condition. The instructions emphasized the importance of the S's attending to the snake for the length of time required. The initial two minutes of physiological recording, following snake-presentation, was marked on the polygraph paper and considered a pre-treatment assessment

of anxiety.

For five minutes following instructed exposure the snake was removed from vision and the S told to sit quietly without talking. At the end of this time period the snake was again exposed and post-treatment physiological measurements taken for two minutes, before the S was permitted to leave.

Facilitation (F)

The facilitation hypothesis (Vodde and Gilner, 1971) entails a procedure utilizing simultaneous exposure to the phobic object and a response not believed to be physiologically antagonistic to anxiety. Following the two minute pre-treatment assessment phase, during which time the S was required to maintain constant contact with the snake as in previous conditions, the Ss undergoing this procedure were given instructions explaining that they were to be provided with an incentive for remaining in the presence of and continuing to touch the snake for a period of 25 minutes. It was explained that they were to establish contact at two minute intervals and to maintain this contact for ten seconds at a time. The incentive consisted in each S's receiving ten cents per minute for a total amount of $2.50. At the end of the intervening treatment period a mark was made on the recording paper and exposure to the snake was terminated. At this point the S was simply instructed to sit quietly without talking for five minutes. After five minutes the snake was again exposed and the remaining two minutes devoted to post-treatment assessment of anxiety. The S was then disengaged from the apparatus and allowed to depart.

Control (C)

This condition was included in an effort to regulate or control for the intervention of extraneous variables, i.e., extra-treatment variables which might be responsible for dependent variable changes. Immediately following instrument calibration and collection of baseline data, the Ss assigned to this condition were instructed to sit quietly and rest for the duration of the session while their physiological responses were recorded. Post-treatment baseline collection, as well as termination procedures were the same as those undergone in the other groups.

Following the treatment and control procedures, each individual S again underwent the seven-point behavioral approach test which was conducted in the same manner as during the pre-treatment phase.

RESULTS

A single factor analysis of variance was computed on each physiological measure (respiration and skin conductance) and the approach test scores in order to assess over-all treatment effects. The results indicated an over-all treatment difference, significant at the .05 level, with respect to the skin conductance measure (see Table I).

Insert Table I about here

Further analysis of these differences was undertaken by way of Newman Keuls testing, and the Habituation condition was found to have produced a significantly ($p < .05$) greater reduction in skin conductance than the Control procedure (see Figure I).

Insert Figure I about here

No significant differences were found among groups with reference to changes in the respiration measure (see Table II, Figure II).

Insert Table II about here

Insert Figure II about here

Table I.

ANALYSIS OF VARIANCE FOR SKIN CONDUCTANCE SCORES

Source of variation	df	MS	F
Between treatments	3	35.62	3.18*
Within treatments	20	11.21	
Total	23		

* $p < .05$

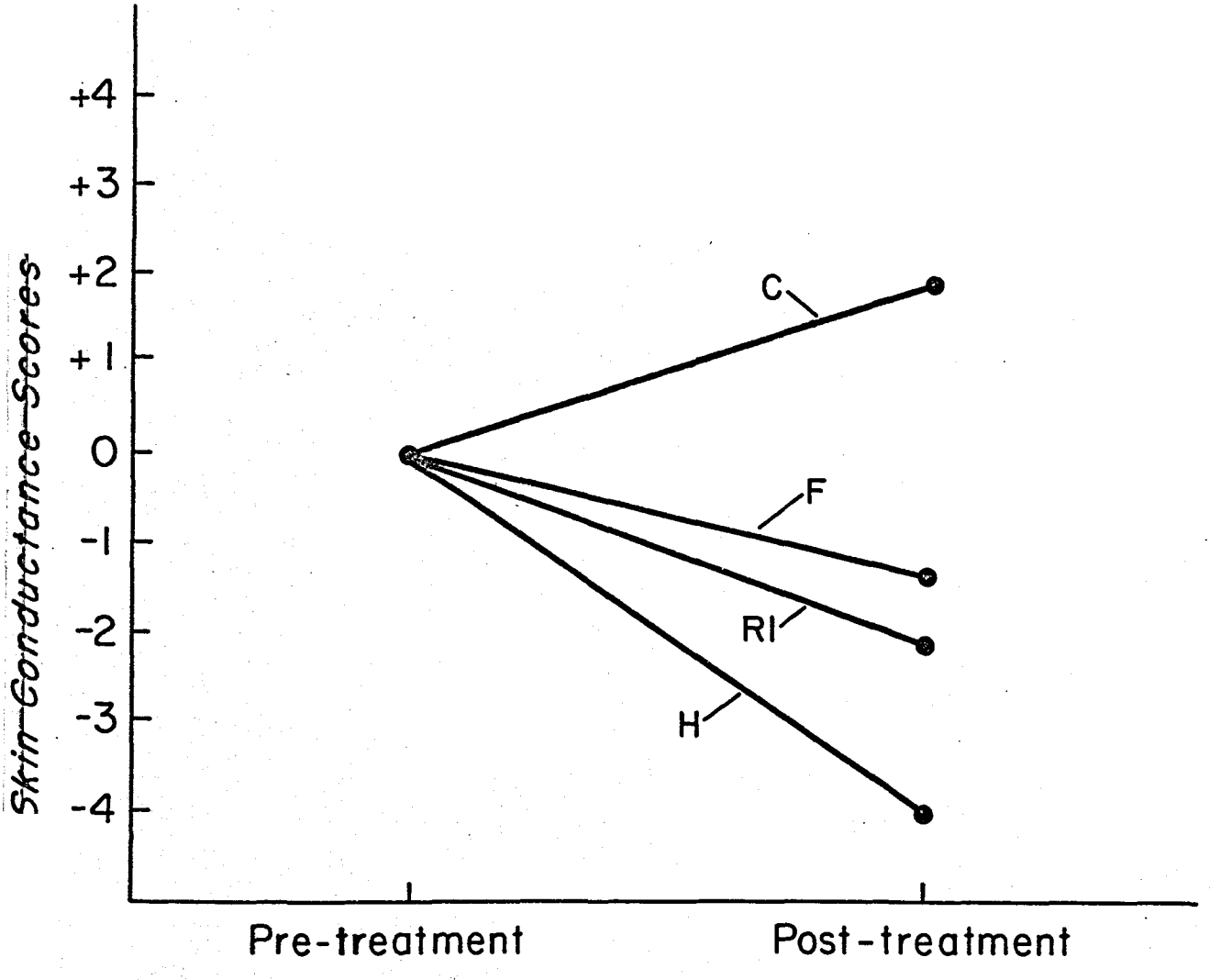

Fig. 1. Mean change in Skin Conductance scores from Pre- to Post-treatment.

Table II

ANALYSIS OF VARIANCE FOR RESPIRATION SCORES

Source of variation	df	MS	F
Between treatments	3	1.77	.9672
Within treatments	20	1.83	
Total	23		

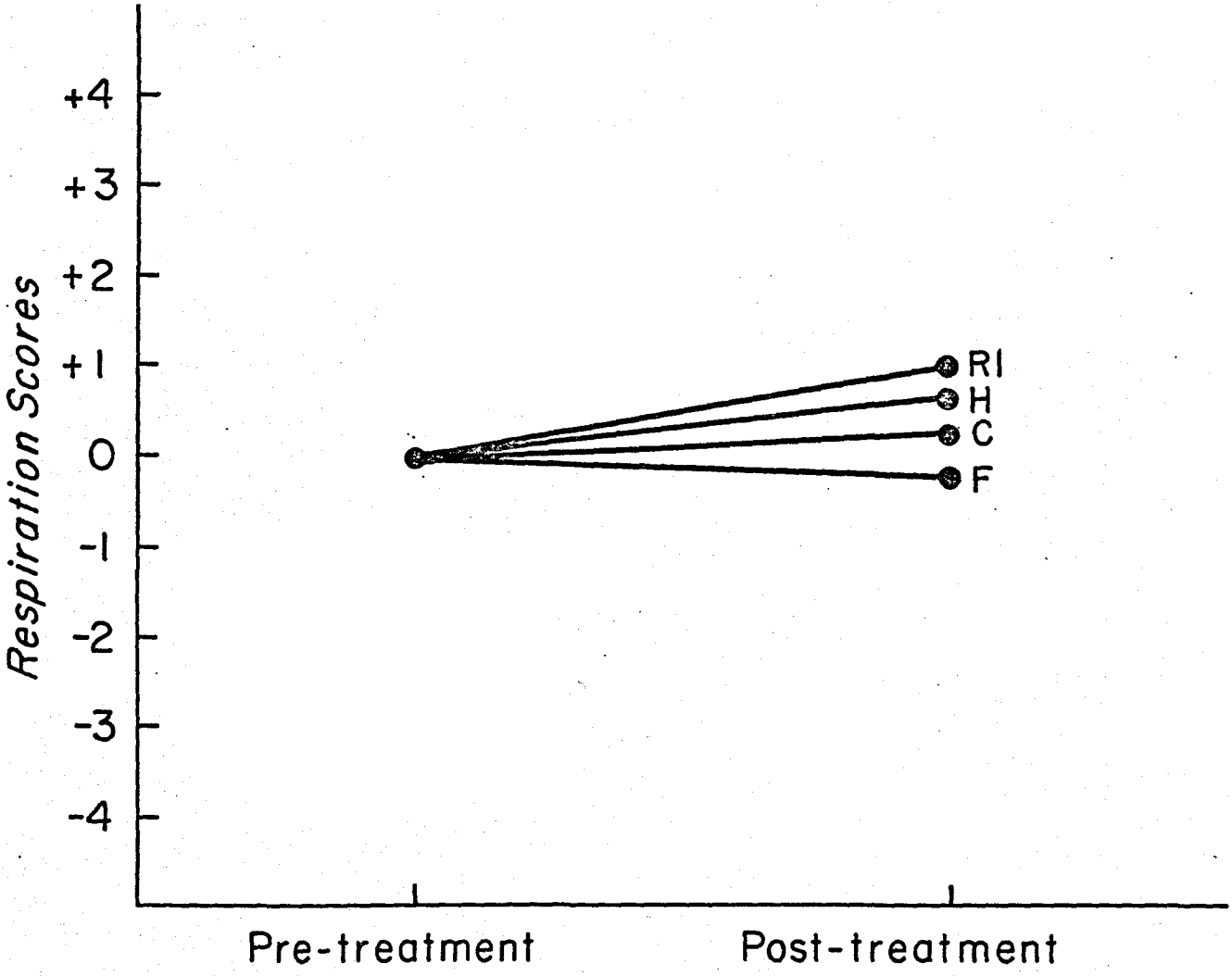

Fig. 2. Mean change in Respiration scores from Pre- to Post-treatment.

With respect to approach test scores, a difference was found at the .01 level of significance (see Table III). The data were analyzed by

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Insert Table III about here

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means of a Newman Keuls test, and the results indicated the Facilitation procedure to have produced a significantly ($p < .05$) greater reduction in avoidance scores than both Habituation and Control conditions (see Figure III).

Insert Figure III about here

In an effort to examine within-group pre-post differences, or individual treatment effectiveness, a series of t tests was computed for each of the dependent variable measures under each of the four treatment conditions. Significant pre-post treatment differences ($t = -3.01$, $df = 23$, $p < .05$) were found for the Habituation procedure with respect to a reduction in the skin conductance measure. Further significant differences ($t = 4.24$, $df = 23$, $p < .01$) were found for the Facilitation procedure, with reference to a reduction in avoidance scores derived from the approach test. All other pre-post differences, including the RI condition, failed to reach significance at the .05 level.

Table III

ANALYSIS OF VARIANCE FOR APPROACH TEST SCORES

Source of variation	df	MS	F
Between treatments	3	11.08	20.91*
Within treatments	20	.53	
Total	23		

* $p < .01$

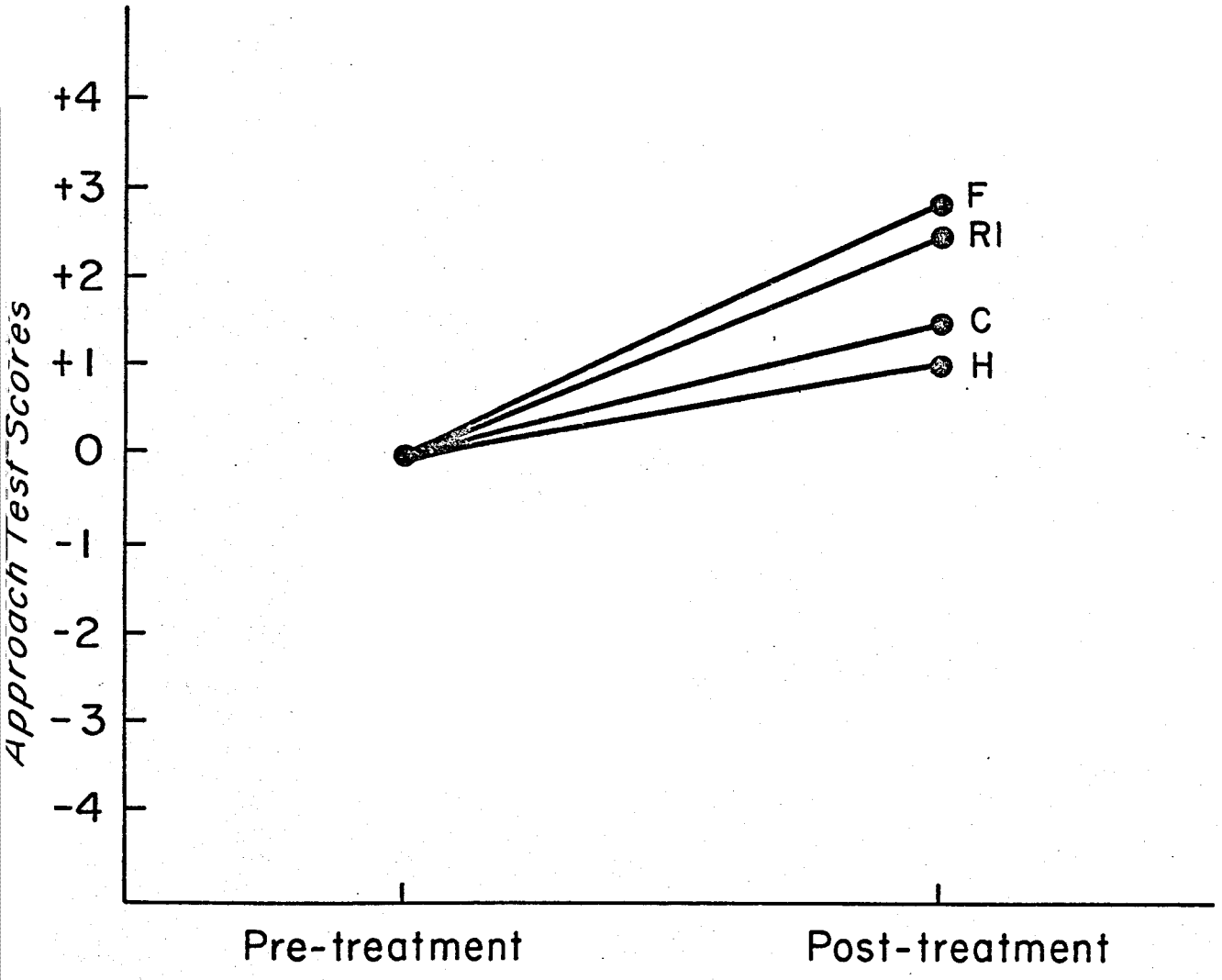

Fig. 3. Mean change in Approach Test scores from Pre- to Post-treatment.

DISCUSSION

The results of the present investigation fail to confirm the hypothesis that the reciprocal inhibition procedure would produce significantly greater reductions in anxiety with regard to all dependent variable measures. Rather, it must be concluded that the comparative effectiveness of the treatments employed is a function of the measure being taken, be it physiological or behavioral. As such, these findings are at variance with at least some of the recent research bearing on this controversial issue (Paul, 1969; Davidson, 1968; Lomont and Edwards, 1965).

With respect, then, to the questions which lead to this study, the first must be answered in the negative. Brief relaxation training was not found to be a necessary element in the effective reduction of phobic anxiety responses. On the contrary, the reciprocal inhibition condition, encompassing two sessions in progressive relaxation training, was found to be no more effective in reducing snake fear than the control procedures with respect to all dependent variable measures. These results, of course, challenge Wolpe's basic assumptions concerning the anxiety-inhibiting function of brief relaxation training.

With the notable exception of Paul (1969), the available knowledge regarding this issue, together with the present findings, provide support for Grossberg's (1965) conclusion that brief relaxation training produced no marked physiological effect. Grossberg compared the effects of two

sessions in relaxation training via tape recorded instructions with two control procedures with regard to reduction of anxiety. Electromyogram monitoring from the forehead and forearm together with skin conductance and heart rate recordings indicated no differences in general arousal level among the groups in any of the measures used.

Further negative results, obtained from more recent studies in which Ss have received similar training in relaxation, tend to support Grossberg's conclusion that brief training is only slightly, if at all, effective in reducing autonomic anxiety (Van Egeren, Feather, and Hein, in press).

It is difficult to reconcile the findings of the present analogue study and the Grossberg study with the very different results obtained by Paul (1969), in which the group trained in muscular relaxation was found to have a significantly greater decrease in physiological activity over sessions in all measures except skin resistance. In view of the rather similar procedures employed, with reference to the administration of relaxation training, the contradictions suggest the operation of at least some factors not yet fully understood. The evidence (Mathews, 1971) appears to suggest the possibility of transient reductions in cardiovascular, respiratory and muscular activity following brief training while more extensive relaxation may be accompanied by a general lowering of arousal level (Mathews and Gelder, 1969). However, with the exception of findings of Paul (1969), no direct evidence has been found in support of the cornerstone assumption underlying reciprocal inhibition theory, that brief relaxation training reduces or prevents the autonomic anxiety responses associated with phobic anxiety.

Although by no means conclusive, some recent research (Folkins, et. al., 1968; Lang, et. al., 1970; Antrobus, 1968) has given rise to the hypothesis that relaxation may function to facilitate response reduction by increasing the vividness of imagery during imaginal desensitization, while maximizing response decrement with repeated presentations of *in vivo* stimuli (Mathews, 1971). Should relaxation training come to be viewed as a facilitating agent future research efforts should be directed at discovering whether an immediate inhibition of the anxiety response, an accelerated rate of response decrement, or both are involved in successful desensitization.

Based on the present findings, the question concerning the theoretical mechanism underlying desensitization must also be answered in the negative. The reciprocal inhibition procedure administered within this study failed to produce any significant decrements with regard to all dependent variable measures. On the contrary, the Ss undergoing this condition manifested the greatest comparative, although non-significant, increase rather than decrease in respiration rate from pre-to-post testing. These results contraindicate the acceptance of reciprocal inhibition as the mechanism operative in the successful reduction of phobic anxiety responses

As previously mentioned, one of the more outspoken critics of the Wolpian model has been Lomont (1965) who holds the desensitization process to be based solely on classical extinction. In support of this alternative interpretation of desensitization, there does exist strong evidence to suggest that predictable autonomic responses follow the visualization of

phobic stimuli, and that these responses decline systematically with repetition, even in the absence of relaxation training (Mathews, 1971; Craig, 1968).

Additional support for a habituation based interpretation of the desensitization process is provided by the findings of the present study. The habituation procedure produced significantly greater reductions in snake fear than controls, as assessed by skin conductance measures. The Ss received no relaxation training and were instructed only to attend to the phobic object, touching it with a gloved-hand intermittently for short periods of time. The approach test findings of the present study provide further evidence in support of a habituation interpretation. The Ss undergoing the facilitation condition were seen to manifest significantly greater increases in approach behavior then Ss within both the habituation and control groups. It should be understood, with reference to these latter results, that the facilitation hypothesis, according to Vodde and Gilner (1971), is a habituation-based procedure. Although the Ss were rewarded with points, later redeemable for money, for remaining in the presence of and attending to the snake, this incentive, according to the original authors, functions solely as a facilitating agent for the habituation of the avoidance response, in the absence of real aversive consequences.

Why, then, were such different results obtained between habituation and facilitation Ss following post-treatment testing? Since Ss undergoing the facilitation condition received reinforcement for remaining in the presence of the snake, some mention should be made of the operant conditioning possibly involved in this procedure. In view of the significantly

greater approach test scores for these Ss as compared to Ss undergoing alternative treatments, it seems possible that there existed some degree of transfer of approach behaviors toward the snake from Session II procedings to post-treatment appraoch test performance for facilitation Ss. While both skin conductance and respiration measures must be considered respondents, the approach test for those Ss receiving an incentive might best be considered an operant. If this is the case, then Ss receiving reinforcement for approach behaviors earlier in the experiment might understandably manifest greater post-treatment approach test scores, as compared to Ss not having been previously rewarded in a like manner. As such, some explanation is arrived at as to the varying results found for habituation and facilitation Ss with reference to approach test assessment.

With regard to skin conductance measures, the facilitation procedure was found to be less effective than habituation in reducing snake fear. If the facilitation condition is in reality a habituation-based treatment, why should such variation exist with regard to these results? In a study investigating the cognitive consequences of forced compliance, Festinger and Carlsmith (1959) found that greater attitude change, i.e., positive regard for a monotonous tast, was induced in Ss paid a dollar for their participation than for Ss paid $20.00 to perform the task. In explanation, the authors suggest that the underpaid participants, in order to reduce cognitive dissonance, and thus, avoid the feeling that they were "a cheap bribe", will convince themselves that they acted as they did because they believed in what they were doing. On the other hand, Ss paid a large sum need not have changed their attitudes toward the task, since, surely for

such a large sum, everyone would have acted accordingly. The situation is, in many respects, analogous to having been instructed to maintain contact with a live snake. While Ss undergoing the facilitation procedure followed the instructions, they perhaps found no need to change their attitude toward the snake, since they were being paid to remain in close contact. While they may have anticipated some attitude change as a result of the treatment, the impetus for change need not have been intrinsic since they received payment as a result of experimental conditions. The habituation Ss, however, although also anticipating attitude change, received no extrinsic reward for their actions. To have continued to maintain contact with a feared object, these Ss, in order to reduce cognitive dissonance, may well have convinced themselves cognitively that their fears were dissipating. This cognition may have in turn effected the physiological responding of these Ss, such that reduced skin conductance scores may have resulted.

In the research of the many factors known to influence findings with reference to the reduction of autonomic activity by way of desensitization and related procedures, Van Egeren (in press), among others, has laid particular stress upon the physiological measure utilized. A rationale underlying the choice of the physiological measures used already having been stated, it would seem appropriate to compare the outcome of the present analogue research with the findings of similar studies utilizing identical measures. Skin conductance levels during presentation of real-life phobic stimuli (snakes) were used by Lomont and Edwards (1967) as one measure of outcome in a comparison of desensitization with and without relaxation. While significant group differences were found in the present

study in favor of the habituation condition, these authors found no such differences, both groups having shown a large reduction in the skin conductance response. Likewise, Paul (1969) found all Ss to show reductions over time as measured by skin conductance, and again, between-group differences were lacking. Paul, in an effort to explain these findings, suggests the possibility that although skin conductance might gradually decrease along with sweat gland activity, as greater reductions in sympathetic activity occur, peripheral vasodilation could paradoxically effect the level of skin conductance. Essentially, this might mean that skin conductance changes vary in a direction opposite of other physiological measures, and that caution should be exercised in the interpretation of this measure.

With respect to respiration rate, a measure differing from other physiological measures in that it is a less accurate index under voluntary control, available studies (Mathews and Gelder, 1969) seem to indicate results similar to the present findings. While alterations in respiration appear to follow the application of alternative treatment conditions, significant group differences are consistently lacking. It is interesting to note that within the present study, the reciprocal inhibition, habituation, and control procedure all function to increase rather than decrease breathing.

Of related importance is the degree of association/disassociation between physiological and behavioral changes following treatment within the present study. It is generally held (Mathews, 1971) that relationships between change scores derived from different assessment procedures tend to be fairly low, and although actual correlations concerning extent of

change were not computed within the present envestigation, there is some degree of dissociation between physiological and behavioral measures indicated within the present study. While skin conductance is well known (Mathews, 1971) for its rapid habituation to phobic stimulation, it may be that physiological measures in general undergo alterations at a faster rate than either verbal or gross behavioral indices of fear.

On the basis of the present research findings, it seems reasonable to conclude that brief relaxation training, although possibly functioning as a facilitation agent, is not a necessary element in the reduction of phobic anxiety responses. Further, it must be concluded that the comparative effectiveness of the treatments employed is a function of the measure being taken, be it physiological or behavioral. With reference to future research, depending upon what aspect of fear is to be measured, i.e., skin conductance recordings or the approach to a feared object, investigators should select that method which has been shown to be maximally effective in modifying that aspect of fear.

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